

IVS Analysis Center at Main Astronomical Observatory of National Academy of Sciences of Ukraine

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Abstract

This report summarizes the activities of the VLBI Analysis Center at the Main Astronomical Observatory of the National Academy of Sciences of Ukraine in 2010.

1. Introduction

The VLBI Analysis Center was established in 1994 by the Main Astronomical Observatory (MAO) of the National Academy of Sciences of Ukraine (NASU) as a working group of the Department of Space Geodynamics of the MAO. In 1998 the group started its IVS membership as an IVS Analysis Center. The MAO AC is located at the office building of the observatory in Kiev.

2. Technical Description

VLBI data analysis at the center is performed on two computers: an Intel Core 2 Duo 3.1 GHz box with 4 Gb RAM and a 1 TB HDD, and a Pentium-4 3.4 GHz box with 1 GB RAM and two 200 GB HDDs. Both computers are running under the Linux/GNU Operating System.

For data analysis we use the STEELBREEZE software which was developed at the MAO NASU. The STEELBREEZE software is written in the C++ programming language and uses the Qt 2.x widget library. STEELBREEZE makes Least Squares estimation of different geodynamical parameters with the Square Root Information Filter (SRIF) algorithm (see [1]).

During 2010 we ported STEELBREEZE to use the Qt3 library. Now there is no need to compile. Qt2 library and STEELBREEZE can be linked with the Qt3 library which is provided with any Linux distribution.

The software analyzes VLBI data (time delays) of a single session or a set of multiple sessions. The time delay is modeled according to the IERS Conventions (2003) [2], as well as by using additional models (tectonic plate motion, nutation models, wet and hydrostatic zenith delays, mapping functions, etc.). The following parameters are estimated: Earth orientation parameters, coordinates and velocities of a selected set of stations, coordinates of a selected set of radio sources, clock function, and wet zenith delay.

3. Staff

The VLBI Analysis Center at Main Astronomical Observatory consists of three members:

Yaroslav Yatskiv: Head of the Department of Space Geodynamics; general coordination and support of activity of the Center.

Svitlana Lytvyn: Junior research scientist of the Department of Space Geodynamics; investigates the stability of VLBI-derived celestial and terrestrial systems.

Sergei Bolotin: Scientific consultant on VLBI software development.

4. Current Status and Activities in 2010

In 2010 we performed regular VLBI data analysis to determine Earth orientation parameters. “Operational” solutions were produced and submitted to the IVS on a weekly basis. The IERS Conventions (2003) [2] models were applied in the analysis. In the solutions, station coordinates and Earth orientation parameters were estimated.

Also, this year we continued to participate in the IVS Tropospheric Parameters project. Estimated wet and total zenith delays for each station were submitted to IVS. The analysis procedure was similar to the one used for the operational solutions.

5. Plans for 2011

The MAO Analysis Center will continue to participate in operational EOP determination, as well as in updating the TRF and CRF solutions from VLBI analysis of the full data set of observations. We also plan to port STEELBREEZE to use the Qt4 widgets library.

Acknowledgements

The work of our Analysis Center would be impossible without the activities of other components of IVS. We are grateful to all contributors from the Service.

References

- [1] Biermann, G.J., 1977, Factorization Methods for Discrete Sequential Estimation, V128, Mathematics in Science and Engineering Series, Academic Press.
- [2] IERS Conventions (2003), IERS Technical Note 32, eds. D.D. McCarthy and G. Petit, Bundesamt für Kartographie und Geodäsie, Frankfurt am Main.